The road safety implications of illegal street racing and associated risky driving behaviours: An analysis of offences and offenders

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Abstract

The purpose of this study was to explore the road safety implications of illegal street racing and associated risky driving behaviours. This issue was considered in two ways: Phase 1 examined the descriptions of 848 illegal street racing and associated risky driving offences that occurred in Queensland, Australia, in order to estimate the risk associated with these behaviours; and Phase 2 examined the traffic and crash histories of the 802 male offenders involved in these offences, and compared them to those of an age-matched comparison group, in order to examine the risk associated with the driver. It was found in Phase 1 that only 3.7% of these offences resulted in a crash (none of which were fatal), and that these crashes tended to be single-vehicle crashes where the driver lost control of the vehicle and collided with a fixed object. Phase 2 found that the offender sample had significantly more traffic infringements, licence sanctions and crashes in the previous three years than the comparison group. It was concluded that while only a small proportion of racing and associated offences result in a crash, these offenders appear to be generally risky drivers that warrant special attention.

Keywords:

illegal street racing; risky driving; crash risk.

1. Introduction

Illegal street racing and associated risky and nuisance driving behaviours are an international road safety issue that has been neglected until recently (Vingilis & Smart, 2009). In Australia, the behaviours associated with illegal street racing generally include activities such as “burn outs”, “donuts”, “drifting”, speed trials, rolling road blocks (or road blockades) and unnecessary speed or acceleration. For a complete description of the types of driving behaviours associated with illegal street racing in each Australian jurisdiction, the reader is referred to Table 2 in Leal et al.(2010a). The group of behaviours examined in this paper are consistent with the prescribed offences under Queensland legislation designed to target these behaviours (*Police Powers and Responsibilities Act and Another Act Amendment Act 2002*), and include: dangerous operation of a motor vehicle; careless driving of a motor vehicle; racing and speed trials on roads; and wilfully starting a vehicle, or driving a vehicle, in a way that makes unnecessary noise or smoke.

There are a number of ways that the crash risk of illegal street racing and associated risky driving behaviours could be quantified: (1) the likelihood that these behaviours contribute to crashing (i.e., the riskiness of the behaviour); (2) the proportion of all crashes that involve these behaviours (i.e., the involvement of these behaviours in crashes); and (3) the general driving behaviour of drivers who engage in these risky driving behaviours (i.e., the general riskiness of involved drivers).

1.1 The riskiness of illegal street racing and associated risky driving behaviour

Estimating the riskiness of behaviour requires knowledge of prevalence in terms of total incidents, and then the proportion of these incidents that then result in a crash. While involved drivers are likely to accurately recall the number of crashes they have been involved in, it would be more difficult for them to accurately recall the total number of illegal street races, and associated risky driving behaviours, they have performed. A more quantifiable

measure may be to calculate the proportion of offences, rather than incidents, that result in a crash, although it is acknowledged that this may over-estimate the true proportion of all incidents that result in a crash, as crashes (particularly minor crashes) that occur during these incidents that are not detected by police may be less likely to be reported[1]. Thus attempts to quantify the proportion of all crashes that involve these behaviours using official data sources alone are likely to underestimate their true involvement in crashes. In contrast, estimating the involvement of illegal street racing and associated risky driving behaviour in *crashes* is more straight-forward.

1.2 The involvement of illegal street racing and associated risky driving behaviour in crashes

The Fatality Analysis Reporting System (FARS), maintained by the National Highway Traffic Safety Administration (NHTSA) in the United States, added racing as a factor in 1998. Knight et al. (2004) examined FARS data for the years 1998 to 2001 and found that a total of 315 (0.21%) fatal crashes involved street racing, resulting in 399 fatalities. Compared with all fatal crashes, street racing fatal crashes were more likely to occur on urban roadways and more likely to occur in the late evening and early morning hours. The researchers concluded that street racing involves risky driving behaviours and warrants further attention, as they argued that urban roads often have increased traffic flow and fixed objects, such as street lights, that may add to the risk of a fatality during a street racing event (Knight et al., 2004). A limitation of Knight et al.'s research is that non-fatal crashes were not examined. Further, the behaviours that are the focus of this paper encompass a broader group of behaviours than illegal street racing alone (e.g., burn outs, donuts).

Current data entry practices in Queensland, Australia, do not specifically identify these driving behaviours as factors contributing to crashes, although it is possible to search

[1] A self-report study in a larger program of illegal street racing and associated risky driving behaviour research found that drivers were less likely to have reported crashes involving these behaviours than they were to have reported crashes generally, and reporting of minor (i.e., non-injury) crashes was particularly low (Leal, 2010).

for these terms in free text fields, such as the "crash description" field. Illegal street racing and associated risky driving behaviour-related crashes in Queensland were identified by searching the crash descriptions of all crashes involving drivers aged between 12 and 24 years old that occurred between 1999 and 2004 for words that indicated these behaviours, such as "hoon"[2], "racing", "burn out" and "donut" (Armstrong & Steinhardt, 2006). A total of 169 crashes were identified[3]. Similar to the findings of Knight et al. (2004), most of these crashes (78%) occurred within 60 kilometres per hour and lower speed zones, on metropolitan roads (60%), during the evenings or at night (between 5pm and 4am; 72%) (Armstrong & Steinhardt, 2006).

The inclusion of dedicated codes for illegal street racing and associated risky driving behaviours as factors contributing to crashes on official forms should make it easier to identify relevant crashes in future. However, it is important to acknowledge that biases in such data may still exist, for example: not all crashes (i.e., minor crashes) are eligible for inclusion in mass crash databases; and given the illegality of these behaviours, there is likely to be far more motivation for drivers to refrain from reporting a crash to police or an insurance company than there are benefits for reporting the crash, or at least not admitting to an attending police officer that they were engaging in risky driving at the time of the crash.

1.3 The general riskiness of involved drivers

An alternative method of exploring the road safety implications of behaviour is to examine the general riskiness of drivers who engage in the behaviours of interest. For example, Finnish research suggests that drivers who engage in illegal street racing have a history of crash involvement, as most of the "cruising club" boys observed in the study revealed that they had been involved in six or seven crashes (Vaaranen & Wieloch, 2002).

[2] "Hooning" is the term used in Australia to refer to this group of behaviours. "Hoon" refers to a driver who engages in these behaviours.
[3] A total of 59,014 crashes met the driver age requirements. However, not all crash descriptions were examined – only those that included the search terms.

The majority of these crashes occurred when the driver lost control at a high speed, and the car ran off the road (Vaaranen & Wieloch, 2002). This research also found that heavy alcohol use and careless risk-taking were common among street racers (Vaaranen & Wieloch, 2002). This finding suggests that, besides any risk associated with illegal street racing, there may be behaviours associated with it that may increase crash risk and / or crash severity of the crash that warrant further attention.

A recent study compared the complete driving histories of drivers involved in illegal street racing offences to those of an age and gender matched comparison group(Leal et al., 2010b). While this research found that illegal street racing offenders had significantly more traffic offences, licence sanctions and crashes than the comparison group, suggesting they are a problematic group that warrant special attention, it is important to note that illegal street racing represents only one fifth of these risky driving offences in Queensland (Leal et al., 2007). While the focus on illegal street racing may be more relevant in an international context than the group of behaviours in Australian jurisdictions that are the subject of this paper, legislation targeting similar types of risky driving behaviours is emerging in North American jurisdictions. For example, the Canadian province of Ontario is targeting illegal street racing and "stunt driving", including similar behaviours to the associated risky driving behaviours in Australia, with tough laws including a vehicle impoundment and forfeiture program. Further, incidents in drivers' traffic histories from many years ago are not necessarily indicative of current road safety risk. It is, therefore, necessary to replicate this study using a sample of all offenders (rather than illegal street racing offenders alone), and using a shorter time frame so that conclusions about current road safety risk can be drawn.

1.4 The present study

This study consisted of two phases designed to explore the road safety implications of these behaviours. Phase 1 of this study considered the riskiness of these behaviours by

examining offences that occurred in the Australian state of Queensland during a 15-month period. Phase 2 of this study considered the general riskiness of involved drivers by addressing the limitations of the Leal et al. (in press) study noted in section 1.3. The official traffic offence and crash data records for the Phase 1 sample of offenders were compared to those of a comparison group, with the timeframe for analysis limited to three years prior to the offence that resulted in their inclusion in this research.

1.4.1 Hypotheses

No specific hypotheses were tested in Phase 1 of this study, due to the exploratory nature of this phase. Rather, the purpose of Phase 1 was to investigate the proportion of illegal street racing and associated risky driving offences in Queensland that resulted in a crash, and to describe these crashes.

Consistent with the results of the case comparison study of the traffic histories of illegal street racing offenders discussed in section 1.3(Leal et al., 2010b), and previous illegal street racing research (Knight et al., 2004) the specific hypotheses tested in Phase 2 of this study were:

H1: Offenders will have more previous traffic infringements compared to the comparison group;

H2: Offenders will have more previous licence sanctions compared to the comparison group; and

H3: Offenders will have more previous crashes compared to the comparison group.

It is acknowledged that the dependent measures examined by these hypotheses are likely to be related. As many traffic infringements in Queensland result in demerit points on the drivers' licence, drivers with many traffic infringements are more likely to have licence sanctions, specifically demerit point suspensions or good behaviour bonds, which are applied when the driver exceeds the maximum number of demerit points on their licence. Further,

there is evidence that drivers with traffic infringements are more likely to be crash-involved (e.g., Chandraratna et al., 2005; Chen et al., 1995), and some crashes may result in the detection of traffic infringements.

2. Method

2.1 Samples

Since the introduction of vehicle impoundment legislation designed to target illegal street racing and associated risky driving behaviours in November, 2002 (and until the end of 2009), 5,470 vehicles have been impounded for these offences in Queensland (Queensland Police Service, unpublished data). However, the drivers of these vehicles are difficult to identify in official datasets. While a number of offence codes can be used for the prescribed behaviours, these offences are not unique to this legislation. For example, dangerous operation of a motor vehicle can be applied in other instances, such as after a road traffic crash, or in conjunction with a drink driving offence, and may not result in vehicle impoundment. This means that identifying offenders in official datasets is not as simple as searching for a particular offence code, and, therefore, an alternative method of identifying offenders was required. Police introduced an identifier code into the Crime Reporting Information System for Police (CRISP) database from July 1, 2005 to allow more efficient identification of first (code = 1), second (code = 2) or third (code =3) time offenders. As a consequence, it was not possible to easily identify all drivers with an offence since the legislation was implemented for this study, but those who offended on or after July 1, 2005 could be searched for using this field in the CRISP database.

This resulted in a Phase 1 sample of 834 drivers (812 males, 22 females; age range 15 – 50 years, *Mdn* = 20 years) who committed at least one of the 848 offences that occurred between July 1, 2005 and the day before the extraction date of October 1, 2006. Although this sample does not represent all offenders and offences since the legislation was implemented, it

does represent all offenders and offences for the 15-month time period adopted for this study.

For Phase 2, the 22 females in the Phase 1 sample were excluded as low numbers would not allow sufficient cell sizes and, therefore, statistical power for the required analyses. A further 10 drivers were excluded because they could not be identified in Department of Transport and Main Roads maintained databases and, therefore, had no driving history data, leaving an offender sample size of 802 males, with ages ranging from 16 to 50 years (*Mdn* = 20 years). The comparison group for Phase 2 consisted of 802 male drivers with the same age distribution[4]. These drivers were randomly selected from the Transport Registration and Licensing System (TRAILS) database maintained by the Queensland Department of Transport and Main Roads, with the criteria that the comparison group sample had the same age distribution[5] as the offender sample, and that none of the drivers randomly selected for the comparison group were already in the offender group sample. It was not possible to match on any other variables.

2.2 Data sources

The data set for Phase 1 was sourced from Queensland Police Service's CRISP database. All illegal street racing and associated risky driving offences between July 1, 2005 and September 30, 2006 were extracted and de-identified before being provided to the authors. The data file consisted of variables relating to the offender (gender, age, racial appearance, occupation), the offence (offence type, offence day, offence scene), and the vehicle used (type, make, year of manufacture, registration status). The final field was *modus operandi*, and included a description of the offence by the reporting police officer. It was in this final field that some offence descriptions included descriptions of crashes, and that forms

[4] The existing literature suggests that drivers who engage in illegal street racing and associated risky driving behaviours are predominantly young males (Leal et al., 2007; Leigh, 1996; Peak & Glensor, 2004; Vaaranen & Wieloch, 2002; Warn, Tranter, & Kingham, 2004), a group known to be over-represented in crashes. This means that comparing drivers who engage in these behaviours with a group of young males allows researchers to explore whether the risk of the behaviours is significant over and above the young driver problem.

[5] Dates of birth were matched to within 7 days of an individual in the offender sample so the age distributions of groups were statistically equal.

the subject for analysis in Phase 1 of this study. It is important to note that the details in this field do not represent all of the information relating to the crash, as this is routinely collected on a separate form (PT 51) and entered into the then Traffic Incident Reporting System (TIRS, now QPRIME). However, crashes of any severity witnessed or attended by police would generally be included in the *modus operandi* field, whereas only crashes that meet the criteria of inclusion in the Road Crash Information System described previously would require the completion of the crash reporting form and reporting in TIRS.

The data set for Phase 2 of this study was requested from the Queensland Department of Transport and Main Roads. Traffic history information included the date and description of all traffic offences that occurred in Queensland, and all sanctions on the Queensland driver's licence included in the TRAILS database. However, only infringements and sanctions that occurred within three years of the reference date[6] were included in the analyses for this study. Only infringements and sanctions that were upheld were included in the analyses, as all those that were waived on appeal were deleted.

Queensland Department of Transport and Main Roads also provided information regarding the crash histories of both samples of drivers. Details of all crashes on Queensland roads in which the person was in control of the motor vehicle or motorcycle were extracted from the Road Crash Information System database. This database contains data provided by the attending police officer. Similar to the traffic history information, only crashes that occurred within three years of the reference date were retained for analyses. The information extracted included the crash severity, crash nature, and factors the attending police officer determined contributed to the crash.

2.3 Procedure

Ethical clearance was obtained from Queensland Police Service, and the Queensland

[6] For the offender sample, the reference date was the hooning offence date that resulted in their inclusion in this study. As drivers in the comparison group were not included as a result of committing an offence, the median offence date for the offender group was used as the reference date for these drivers.

University of Technology Human Research Ethics Committee. Once these approvals were obtained, Queensland Police Service extracted the offence data from the CRISP database using the identifier code described in section 2.1. De-identified data were sent to the authors for analysis in Phase 1. An age-matched comparison sample was extracted from the TRAILS database. The licence, traffic and crash histories required for Phase 2 were then extracted, and de-identified data files were provided to the researchers in the form of Excel spreadsheets. Most of these data were in text form (i.e., written descriptions of offence types) with numeric codes as labels. Prior to analysis, this data were transformed into a numerical dataset that could be analysed using the Statistical Package for the Social Sciences (SPSS). Traffic infringements were recoded according to their text descriptions, and grouped into nine main offence groups created for this research, described in Table 1. These offence groups were further divided into sub-groups of offences (also created for this research). Offences were allocated to groups and sub-groups based on the offence description. As there are a large number of circumstances the attending officer can select on the crash forms used in Queensland, circumstances for crashes were grouped for these analyses into animal, environment, road, vehicle, other road user and driver.

[Table 1]

2.4 Statistical analysis

There were no formal statistical analyses in Phase 1 of this study. Rather, the crashes that occurred during offences were identified and described. The alpha level adopted for all statistical tests in Phase 2 was $p < .05$. Chi-square tests for independence were performed to compare the proportion of each sample with at least one prior infringement, licence sanction or crash. Mann-Whitney *U* tests were performed to compare the numbers of these outcome measures for the offender and comparison groups, as all data were positively skewed and violated the assumptions of the independent means *t* test.

3. Results

3.1 Phase 1

Of the 848 offences that formed the data set for this study, 31 (3.7%) resulted in a crash described in the *modus operandi* field. Table 2 describes the nature of these crashes and the number of vehicles involved according to the information included in the *modus operandi* field[7], and shows that crashes that occurred with an illegal street racing or associated risky driving offence tended to be single-vehicle crashes where the driver left the road and collided with a fixed object.

[Table 2]

Crashes were less likely to occur with an illegal street racing or speed trial offence than with an excessive noise and smoke offence, as only one crash occurred during an illegal street racing offence, whereas 28 crashes occurred during noise and smoke offences[8]. While this data is limited in that it includes only those crashes (and offences) known to police (rather than all crashes that occur during these types of behaviours that are not known to police), it may suggest that the loss of traction with the road surface and therefore control of the vehicle in noise and smoke offences represents a crash risk.

As Phase 2 of this study involved analysis of traffic and crash information for this sample of offenders, it was possible to analyse this data source in an attempt to further describe these crashes. Sixteen (51.6%) of the 31 crashes were able to be found in the Phase 2 crash records. Given that police witnessed or attended all 31 crashes, it is likely that the remaining 15 crashes were not in the Phase 2 crash data records as they did not meet the criteria for eligibility for entry into the Road Crash Information System (i.e., no injury, or damage bill less than $2500). These 16 records were analysed in order to determine the severity of the crashes, who was injured if the crash involved a casualty, and what

[7] As this data were obtained in offence rather than crash data, further information such as crash severity was not available from this source.
[8] The remaining crashes occurred during offences coded as "Dangerous operation of a motor vehicle".

circumstances or contributing factors were attributed to the crash by police. Table 3 summarises this information, and shows that more than half of the crashes that occurred during offences did not involve an injury. When these crashes did involve at least one casualty, it was equally likely that it was the driver rather than passenger/s that was injured.

[Table 3]

As illegal street racing and associated risky driving behaviours is not a circumstance group or contributing factor on crash forms in Queensland, the circumstances attributed to these crashes were described. Generally, the factors attributed to these crashes involved fault of behalf of the driver, as indicated by the most common factors being violations or driver factors.

3.2 Phase 2

3.2.1 H1: Traffic infringements

Within the offender sample, the total number of traffic infringements recorded in Queensland in the three years prior to the index offence was 3645, and infringements per driver ranged from 0 to 51, with a heavy positive skew to these data. Within the comparison group, the total number of traffic infringements in the three years prior to the reference date was 1005, and infringements per driver ranged from 0 to 22, also with a positive skew. As expected from these descriptive statistics, Table 4 shows that the Chi-square test of independence supported H1, as drivers in the offender group were significantly more likely than drivers in the comparison group to have any prior traffic infringements, representing a moderate to large effect. Further, the Mann-Whitney *U* test showed that drivers in the offender sample had significantly more traffic infringements than drivers in the comparison group, and a series of Chi-square tests revealed that this trend held for all offence types.

[Table 4]

The most common type of offence for both groups was speeding, with approximately

twice as many participants in the offender sample having at least one offence of this type in the previous three years than the comparison sample. Excluding illegal street racing and associated risky driving offences, the next most common offence type for the offender group was vehicle defects.

3.2.2 H2: Licence sanctions

Within the offender sample, the total number of licence sanctions in the three years prior to the reference date for the group was 1053. Per driver, the number of previous licence sanctions ranged from 0 to 11, with a median of 1 as these data were heavily positively skewed. There was a similar positive skew within the comparison group sample, where there were 281 licence sanctions in the three years prior to the reference date. Per driver in this sample, prior licence sanctions ranged from 0 to 8, with a median of 0.

As shown in Table 5, testing of H2 revealed that drivers in the offender group were significantly more likely than those in the comparison group to have had a prior sanction on their licence, representing a moderate effect. The Mann-Whitney *U* test also revealed that drivers in the offender group had significantly more prior licence sanctions than the comparison group, and a series of Chi-square tests revealed that this trend was observed for all sanction types.

[Table 5]

The most common licence sanctions among the offenders were those related to exceeding the maximum number of demerit points on their driver's licence and unpaid fines. In Queensland, when a driver loses all of the demerit points on their driver's licence, they can serve a licence suspension ("demerit points" sanction group in this study) or opt for a good driving behaviour option ("good behaviour"), where only one demerit point remains on the licence for a period of 12 months. If this point is lost, a longer suspension period than initially offered is applied.

3.2.3 H3: Crashes

As shown in Table 6, drivers in the offender sample were significantly more likely to have been involved in a crash recorded in the Queensland Road Crash Information System in the previous three years than drivers in the comparison group, representing a small effect. There were 112 crashes in the offender group, compared to only 45 for the comparison group. Within each sample, the median number of crashes was 0, with a maximum of two crashes per person in the three year period. The Mann-Whitney *U* test on these data revealed that offenders were involved in significantly more crashes than drivers in the comparison group, although very few drivers in either sample had been involved in more than one crash in this relatively short time period. Table 6 also shows that there was no difference in the severity of crashes between the two groups.

[Table 6]

The circumstances attributed to the crashes of each group were compared, and the results are also presented in Table 6. Within both samples, the most common factors attributed to the crashes were inexperience / lack of expertise followed by driving with undue care and inattention. The Chi-square test for independence conducted was not significant, although the effect size may suggest that power was low in this analysis of the group x crash contributing circumstance relationship due to the small number of people involved in crashes. Regardless, inspection of the adjusted standardised residuals and percentages of crashes within each group revealed only small offender versus comparison group differences.

4. Discussion

The aim of this study was to explore the road safety implications of illegal street racing and associated risky driving behaviours. This study involved two phases designed to determine the proportion of these offences that result in crashes (Phase 1), and the extent to which the risky driver (i.e., a driver with an offence of this type) represents a road safety

problem, as evidenced by significantly higher numbers of traffic infringements, licence sanctions and crashes relative to an age- and gender-matched comparison group (Phase 2).

It was found that very few illegal street racing and associated risky driving offences result in crashes, and that when crashes do occur, they tend to be single-vehicle crashes where the driver leaves the roadway and collides with a fixed object. In this regard, these crashes appear similar to the street racing crashes described by Vaaranen and Wieloch (2002). While it could be argued that this suggests that these drivers are only risking their own safety, there may be other passengers in the vehicle, pedestrians, and property that are at risk. Although the crashes associated with these offences may not be serious in nature, there are still costs to the community. Further analysis of these crashes with the data set provided for Phase 2 revealed that the casualties in the injury crashes were equally likely to be the driver or their passengers, and that it was common for fault to be attributed to the offending driver, as violations or other driver circumstances were commonly listed as circumstances or contributing factors for these crashes.

It may be argued that only illegal street racing or speed trial offences pose a crash risk, due to the speeds attained by involved vehicles, while associated offences involving unnecessary noise or smoke are better considered a public amenity issue. However, the potential risks associated with unnecessary noise and smoke offences, where the vehicle has lost traction with the road surface and is essentially out of the driver's control, was illustrated in this study, where all but three crashes that occurred during an offence were unnecessary noise and smoke offences.

Phase 2 of this study involved the testing of three hypotheses, which predicted that the drivers in the offender sample would have significantly more traffic infringements, licence sanctions and crashes as a driver in Queensland in the three years prior to their reference date compared to drivers in the comparison sample. Consistent with the analysis of complete

driving histories of illegal street racing offenders(Leal et al., 2010b), each of these three hypotheses were supported by the results. As the results regarding traffic infringements were significant, it followed that the licence sanction hypothesis (H2) would also be supported, given that most traffic infringements attract demerit points in Queensland, and the most common licence sanctions among the offender sample were those related to the accrual of demerit points. The smaller effect size for licence sanctions is also to be expected, as Queensland licences have between 4 and 12 demerit points[9], and it therefore takes more than one traffic infringement to lose all of these points and become eligible for a licence sanction. These results are also consistent with those of Knight et al. (2004).

The between group differences on the crash measures were also significant, consistent with Finnish research with car club members (Vaaranen & Wieloch, 2002) and analysis of fatal street racing crashes in the United States (Knight et al., 2004). The effect size was smaller than that for traffic infringements or licence sanctions, reflecting the lower numbers of drivers involved in crashes relative to the traffic infringement and licence sanctions, and therefore lower statistical power. However, taken together, these results suggest that, consistent with the international illegal street racing literature, drivers charged and punished with an illegal street racing or associated risky driving offence have traffic and crash histories that provide evidence of other risky driving behaviours, to a significantly greater degree than other similar aged drivers.

4.3 Strengths and limitations

The program of research in which this study was situated was the first to explore the road safety implications of associated risky driving behaviours, as previous research has been limited to illegal street racing. In particular, this research was the first to explore risk from the perspective of the involved driver. In this regard, this study contributes to the limited body of

[9] Provisional licence holders have 4 points, Open licence holders have 12. Provisional licences last for three years in Queensland, thus the age distribution of this study sample indicates that at least half of participants held a Provisional licence at the reference date.

knowledge in the area (Vingilis & Smart, 2009), and complements previous attempts to explore the road safety implications of the behaviour in terms of the proportion of all fatal crashes that involve illegal street racing (Knight et al., 2004), or describing young driver crashes that have evidence of illegal street racing and related behaviours in the free-text crash description field (Armstrong & Steinhardt, 2006). This study has provided empirical evidence that, while few offences result in a crash, drivers with an illegal street racing or associated risky driving offence represent a significant road safety problem over and above the known risk of young males.

However, the results of this study should be interpreted in light of its limitations. First, drivers caught and punished for illegal street racing and associated risky driving behaviour may not be representative of the (unknown) population of drivers who engage in this behaviour. Further research should be conducted to explore whether the trends observed in this study are consistent for the entire population of involved drivers (i.e., both detected and not detected). Such research could also explore whether there are specific factors that increase the likelihood of being detected and punished for an offence (or perhaps more importantly, evading detection and, therefore, avoiding punishment).

Second, the use of the licensing database to select drivers for the comparison group may have introduced a bias, in that it was not possible to match the samples on the many other personal, social and even cultural factors that may influence offending behaviour and general driving behaviour. However, given the nature of the data sets required for this study (official infringement, licence sanction, and crash data), this was the only feasible method of obtaining a comparison sample for whom the required data would be available.

Third, official data collected for routine purposes may include some errors, and only includes crashes reported to police and that meet other inclusion criteria.

Finally, Phase 2 of this study was limited to male offenders and, therefore, the results

of this study may not generalise to the population of offenders. However, given the small number of females detected and punished for these offences in Queensland, the reduction in external validity is likely to be minimal.

5. Implications

Taken together, the findings of the two phases of this study suggest that while only a small proportion of illegal street racing and associated risky driving offences result in crashes, and these crashes are generally of low severity, drivers who engage in these behaviours (and get caught) are likely to have a driving history with evidence of other risky driving behaviours, such as traffic infringements, licence sanctions and crashes. Further, they have more of each of these indicators of risky driving behaviours than drivers matched for age. Therefore, these results suggest that drivers with an illegal street racing or associated risky driving offence represent a significant road safety risk-group over and above the young driver problem. As the risk of illegal street racing and associated risky driving behaviour (as evidenced by the proportion of offences that result in a crash) appears less significant that the risk associated with the driver, perhaps it is the driver that represents the better target for intervention. However, these types of offences may be a useful way of identifying these high-risk drivers.

Future research should now consider whether the countermeasures designed to reduce these behaviours (primarily vehicle impoundment and forfeiture programs) are effective. While there is considerable evidence from North American jurisdictions that this sanction is effective in reducing recidivism among repeat drink drivers and drivers who continue to drive while suspended or disqualified (see Voas & DeYoung, 2002), there is a need to establish its effectiveness for illegal street racing and associated risky driving behaviours, in an Australian context.

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Table 1
Offence groups and sub-groups created for Phase 2

Offence groups	Offence sub-groups
Illegal street racing-related offences	Dangerous driving; Driving without due care and attention; Racing and speed trials on roads; Undue noise and smoke
Impaired driving offences	Alcohol; Drugs; Fail to supply specimen
Police / government instruction offences	Administrative requirement; Crash duties; Fail to stop; Inspection; Produce licence; Provide information
Registration-related offences	Registration plates / labels; Transfer of registration; Uninsured (compulsory third party); Unregistered
Restraint offences	Helmet (self); Helmet (passengers); Seatbelt (self); Seatbelt (passengers)
Road rule / sign / marking offences	Body out of car; Fail to give way; Follow too closely; Headlights; Horn; Illegal manoeuvre; Lane-keeping; Mobile phone; Overtaking; Radar detector; Railway level crossing; Road marking; Sign; Signalling; Traffic lights; Other
Speeding offences	Low-range (up to 15km/hr over limit); Mid-range (15 – 30km/hr over limit); High-range (30km/hr or more over limit)
Licence-related offences	Condition of licence; Disqualified driving; Expired licence; Inappropriate class of licence; Learner Plates; Non-Queensland licence; Suspended licence; Unaccompanied learner driver; Unlicensed driving
Vehicle defect / modification offences	Defective vehicle; Ground clearance; Modifications; Noisy; Notice; Silencer

Table 2
Characteristics of crashes that occurred with offences (N = 31)

	N	**%**
Crash nature		
Hit fixed object	20	64.5%
Hit parked vehicle	3	9.7%
Angle	2	6.5%
Overturned	2	6.5%
Head-on	1	3.2%
Unknown	3	9.7%
Number of vehicles involved		
Single-vehicle	25	80.6%
Multi-vehicle	3	9.7%
Unknown	3	9.7%

Table 3
Severity, casualties and circumstances / contributing factors of crashes that occurred with illegal street racing and associated risky driving offences ($N = 16$)

	N	**%**
Crash severity *(and casualties by road user type)*		
Fatal	0	0.0%
Hospitalisation	3	18.8%
Driver	*2*	
Passenger	*1*	
Medical treatment	3	18.8%
Driver	*3*	
Passenger	*3*	
Minor Injury	1	6.3%
Driver	*1*	
Passenger	*0*	
Property damage only	9	56.3%
Circumstances / contributing factors [a]		
Violation – Dangerous driving	7	46.7%
Violation – Undue care and attention	6	40.0%
Driver – Inexperience / lack of expertise	6	40.0%
Excessive speed for circumstances	5	33.3%
Police chase	2	13.3%
Violation – Over prescribed concentration of alcohol	2	13.3%
Violation – exceeding speed limit	1	6.7%
Condition – Under influence of liquor / drug	1	6.7%
Driver – Fatigue related by definition	1	6.7%
Road – Wet / slippery	1	6.7%
No circumstances / contributing factors listed	1	

[a] Percentages calculated using $N = 15$ as one crash had no circumstances / contributing factors listed. As crashes can have up to four contributing circumstances, these percentages sum to more than 100%.

Table 4
Comparison of prior traffic infringements of illegal street racing and associated risky driving offenders and a random sample of drivers of comparable age (*n*'s = 802)

	Offenders	Comparison Group	Statistics
Prior infringements			χ^2 (1) = 285.90, ϕ = .42***
Yes	686 (85.5%)	364 (45.4%)	
No	116 (14.5%)	438 (54.6%)	
Median number	3	0	U = 143540.5, z = 19.68***
Mean rank	1024.52	580.48	
Drivers with particular infringement types [a]			
Speeding	521 (65.0%)	257 (32.0%)	χ^2 (1) = 173.96, ϕ = .33***
Illegal street racing & assoc.	255 (31.8%)	38 (4.7%)	χ^2 (1) = 196.63, ϕ = .35***
Vehicle defect	254 (31.7%)	47 (5.9%)	χ^2 (1) = 175.24, ϕ = .33***
Road rule / sign	253 (31.5%)	101 (12.6%)	χ^2 (1) = 83.75, ϕ = .23***
Licence related	216 (26.9%)	65 (8.1%)	χ^2 (1) = 98.38, ϕ = .25***
Registration	166 (20.7%)	60 (7.5%)	χ^2 (1) = 57.87, ϕ = .19***
Police / govt.	91 (11.3%)	23 (2.9%)	χ^2 (1) = 43.67, ϕ = .17***
Restraint	80 (10.0%)	26 (3.2%)	χ^2 (1) = 29.46, ϕ = .14***
Impaired	68 (8.5%)	42 (5.2%)	χ^2 (1) = 6.60, ϕ = .06**

[a] Percentages are proportion of sample with at least one of the applicable offence type. As drivers could have more than one infringement, percentages for each sample sum to more than 100%.
* $p < .05$, ** $p < .01$, *** $p < .001$

Table 5
Comparison of prior licence sanctions of illegal street racing and associated risky driving offenders and a random sample of drivers of comparable age (*n*'s = 802)

	Offenders	Comparison Group	Statistics
Prior sanctions			χ^2 (1) = 190.28, ϕ = .34***
Yes	415 (51.7%)	151 (18.8%)	
No	387 (48.3%)	651 (81.2%)	
Median number	1	0	*U* = 207770.0, *z* = 14.41***
Mean rank	944.44	660.56	
Drivers with particular sanction types [a]			
Demerit points	247 (30.8%)	50 (6.2%)	χ^2 (1) = 160.36, ϕ = .32***
Good behaviour	183 (22.8%)	75 (9.4%)	χ^2 (1) = 53.88, ϕ = .18***
Disqualification	142 (17.7%)	59 (7.4%)	χ^2 (1) = 39.18, ϕ = .16***
Unpaid fines	140 (17.5%)	32 (4.0%)	χ^2 (1) = 75.96, ϕ = .22***
High speed	52 (6.5%)	9 (1.1%)	χ^2 (1) = 31.51, ϕ = .14***

[a] Percentages are proportion of sample with at least one of the applicable sanction type. As drivers could have more than one licence sanction, percentages for each sample sum to more than 100%.
* $p < .05$, ** $p < .01$, *** $p < .001$

Table 6
Prior crashes recorded in Queensland's Road Crash Information System of illegal street racing and associated risky driving offenders and a random sample of drivers of comparable age (*n*'s = 802)

	Offenders	Comparison Group	Statistics
Prior crashes			χ^2 (1) = 29.33, p < .001, ϕ = .14
Yes	103 (12.8%)	41 (5.1%)	
No	699 (87.2%)	761 (94.9%)	
Median number	0	0	U = 296761.5, z = 5.41***
Mean rank	833.47	771.53	
Number of crashes per driver			
0	699 (87.2%)	761 (94.9%)	
1	94 (11.7%)	37 (4.6%)	
2	9 (1.1%)	4 (0.5%)	
Crash severity [a]	n = 112	n = 45	χ^2 (3) = 4.13, p = .247, ϕ_v = .16
Fatal	0	0	
Hospitalisation	18 (16.1%)	13 (28.9%)	d_{ij} = -1.8
Medical treatment	23 (20.5%)	8 (17.8%)	d_{ij} = 0.4
Minor injury	15 (13.4%)	3 (6.7%)	d_{ij} = 1.2
Property damage	56 (50.0%)	21 (46.7%)	d_{ij} = 0.4
Contributing circumstances [b]	n = 156	n = 77	χ^2 (12) = 15.46, p = .217, ϕ_v = .26
Driver			
Inexperience	48 (30.8%)	27 (35.1%)	d_{ij} = -0.7
Undue care	32 (20.5%)	10 (13.0%)	d_{ij} = 1.4
Violation	15 (9.6%)	15 (19.5%)	d_{ij} = -2.1
Speed	9 (5.8%)	4 (5.2%)	d_{ij} = 0.2
Alcohol	8 (5.1%)	2 (2.6%)	d_{ij} = 0.9
Fatigue	6 (3.8%)	7 (9.1%)	d_{ij} = -1.6
Dangerous	2 (1.3%)	2 (2.6%)	d_{ij} = -0.7
Road	10 (6.4%)	2 (2.6%)	d_{ij} = 1.2
Environment	6 (3.8%)	4 (5.2%)	d_{ij} = -0.5
Vehicle	6 (3.8%)	0	d_{ij} = 1.7
Animal	4 (2.6%)	1 (1.3%)	d_{ij} = 0.6
Other road user	2 (1.3%)	1 (1.3%)	d_{ij} = 0.0
Other	8 (5.1%)	2 (2.6%)	d_{ij} = 0.9

[a] Adjusted standardised residuals (d_{ij}) are from the perspective of the offender group, where negative residuals indicate a less than expected frequency, and positive residuals indicate a greater than expected frequency.
[b] As crashes can have multiple contributing circumstances, these sum to more than the total number of crashes for each sample.
* p < .05, ** p < .01, *** p < .001